COMTEL Electronics GmbH
Technopark I /
Bretonischer Ring 11
D-85630 Grasbrunn / Germany
Tel: +49 (0)89 43 77 89 - 0
Fax: +49 (0)89 43 77 89 - 77

CO14N Manual

Revision: 2.3

Revision History

Rev	Date	Description	Author
1.0	February 2010	Initial version	Dmitry Tsitsilin
1.1	July 2010	Added Warning notes for PEM	Dmitry Tsitsilin
1.2	July 2010	Caution signs	Dmitry Tsitsilin
2.0	July 2010	UL revised	Dmitry Tsitsilin
2.1	October 2010	Minor text and picture edits, UL	Tom Inglese
2.2	October 2010	Add paint, overlay, S I/O info, mkt.	Dmitry Tsitsilin
2.3	October 2011	Revised	Dmitry Tsitsilin

Table of Contents

Caution - Read this manual before working on this unit.

Caution - HAZARDOUS VOLTAGE! Contact may cause electric shock or burn.

Electronic components are sensitive to static electricity. All electronic boards in this shelf are protected by Shelf Ground. It is recommended that anti-static wrist straps be worn and connected to a known ground connection when removing any Field Replaceable Unit in this shelf.

Caution - Rotating fan blades. Can cause minor injury or cut. Keep hands clear when servicing. Allow time for fan blades to slow to a stop before fully removing.

1 Introduction

1.1 Overview

The Comtel CO14N shelf has the following features and characteristics

- 13U high, 19” wide with brackets for 19” equipment practice
- ESD Wrist strap at the front and rear (banana plug)
- Split backplane design: high speed and power sections are separated
- Dual Star and Full Mesh high speed backplane options
- Dedicated power backplane with sophisticated power distribution
- Power distribution for 300W+ per slot
- Backplane protection by fusing power channels with 30Ampere
- Cooling capability 300W for front boards and 35W for RTM
- Four high pressure RiCool-3 Blower units, hot swappable, front pluggable
- Air filter with redundant presence sensor, front pluggable
- Redundant Power Entry Modules, fuse failure and reverse voltage indicators
- Redundant Shelf FRU Data boards with Telco Alarms
- Redundant carrier boards for Pigeon Point SHMM500 shelf manger, RS232 and Ethernet at front panel, hot swappable
- RoHS Compliant

Specifications:

	Unpackaged		**Packaged (on pallet)**	
Weight	38 kg	84 lbs	50 kg	110 lbs
W (no ears)	435 mm	17.1 in	-	-
W	483 mm	19.0 in	620 mm	24.4 in
H	577 mm	22.7 in	880 mm	34.7 in
D	500 mm	19.7 in	840 mm	33 in
D (cable trays)	573 mm	22.6 in	-	-

The front and rear view of the shelf is shown in the Figure 1 and Figure 2:

Figure 1 CO14N Shelf - Front View

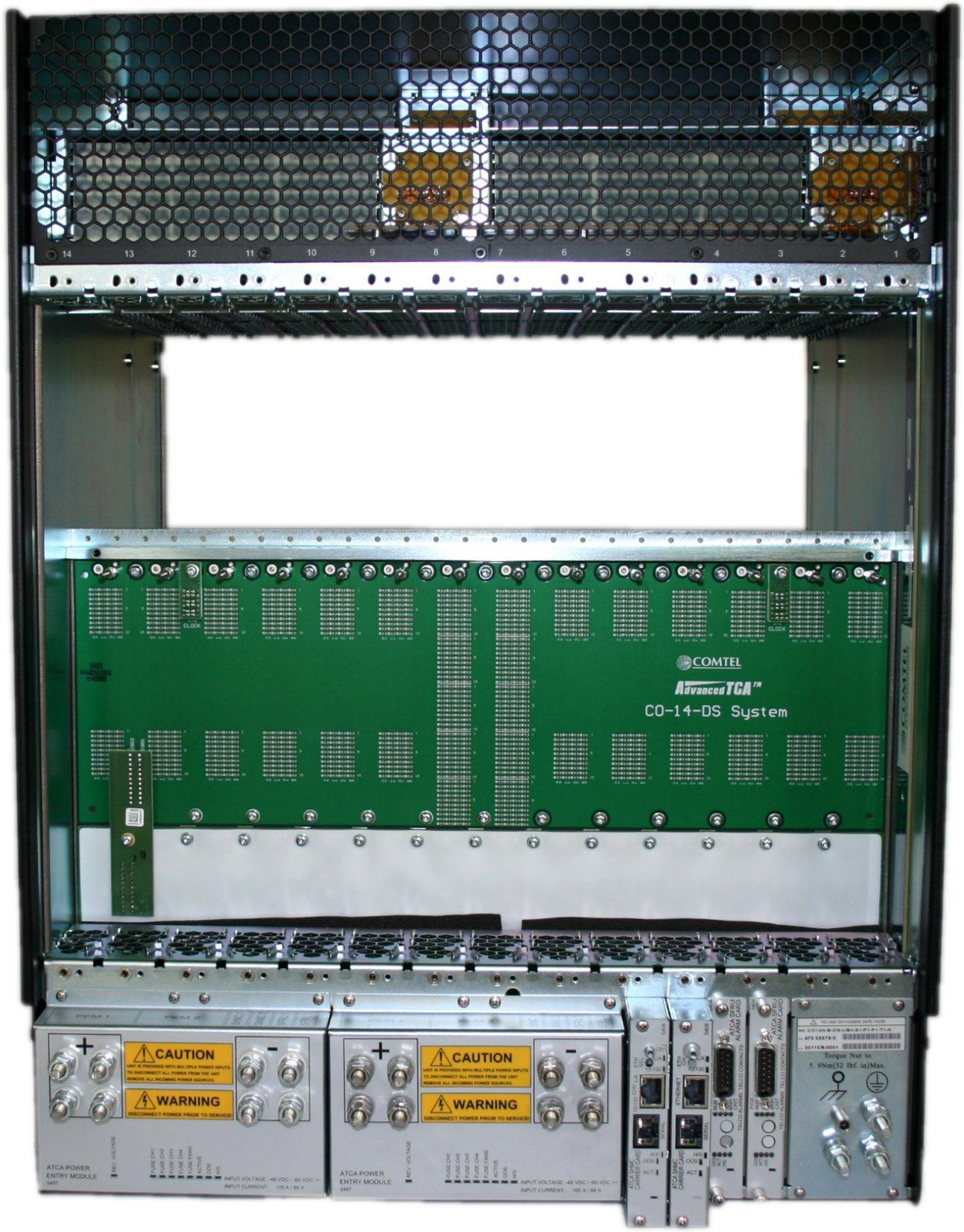


Figure 2 CO14N Shelf - Rear View

1.2 Shelf Installation

Improper installation might cause system damage or personnel injury. Consider the following guidelines:

- Install the system only in area with restricted access
- Follow the installation rules governs in your country
- Power distribution to the shelf must include over current protection devices
- Use appropriate protective bonding conductor according to over current limits for power lines
- Make sure that the personnel will not interfere with cables and cords connected to the rack/shelf

Make sure that the shelf airflow i.e. ventilation openings are not disturbed by cables and rack construction (see Figure 3) otherwise it might lead to system damage.

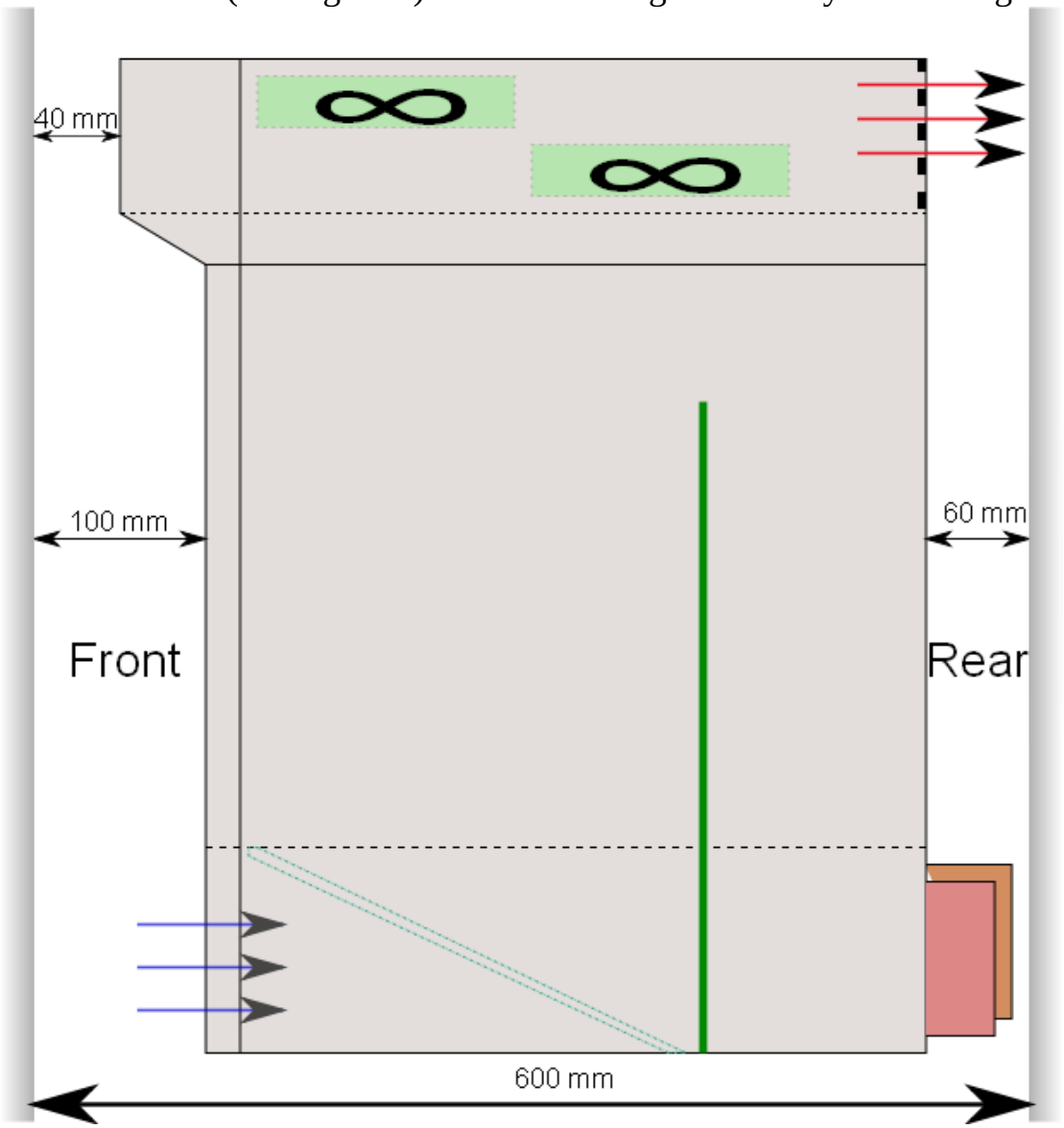


Figure 3 Minimum Clearances While Installing In The Rack

1.3 Shelf labeling

Shelf Nameplate:

- Model name: CO14N
- Manufacture Part Number (optional)
- Serial Number (optional)
- Nominal input voltage and current
- Country of manufacture
- Certification signs/marks

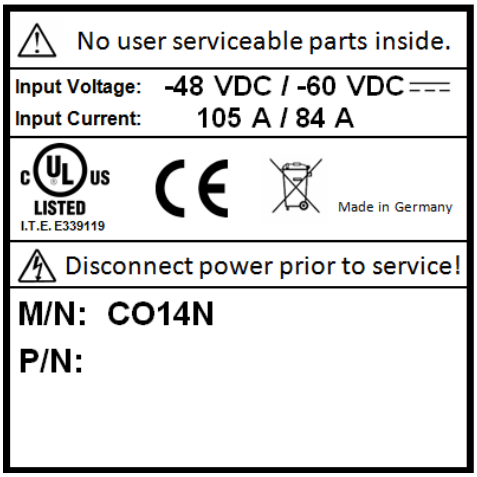
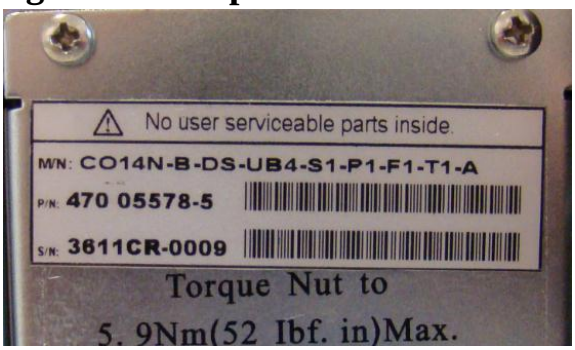


Figure 4 Example Of Shelf Labels

Shelf Serial Number label:

- Model number (full), example:
  CO14N-B-DS-UB4-S2128-P2-T2-A
- Mfg Part Number with Code-39 Bar code
- Serial Number with Code-39 Bar code



Finish:

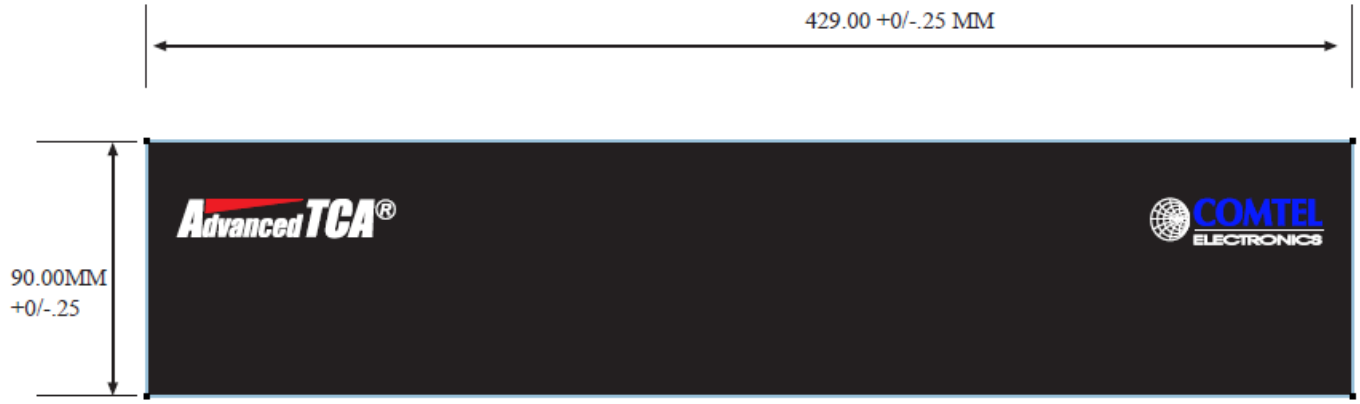
Option "N" - Unpainted Brushed steel, zinc plated
Option "B" - Black RAL9004 – fine texture
Custom - Contact Comtel sales for details

Branding:

The blower door is ideal for an overlay to easily brand as your own. Common specifications and dimensions to create an overlay on the face of the door are provided for convenience:

*Recommended Material:

LEXAN 8B35 MT 0.25MM (POLYCARBONATE)
ADVHESIVE 3M 467, 3M 200MP, or EQUIVALENT



If the label needs to occupy complete surface of the door by bending around the angle the total height of the label will be increased by 45mm and results in 136.00mm:
Door Face: 429 * 90 +0/-.25mm
Door Angle:429 * 45 +0/-.25mm
Note: The Comtel Electronics and AdvancedTCA logo are shown only as examples. Comtel is not responsible for the outcome of the overlay, placement, or copyright compliance.

2 Backplanes

Comtel provides a unique no-compromise split backplane assembly. This enables achieving optimized power distribution while having no impact on high speed characteristics. The power backplane has ultimate stack-up with thick copper layers for no-bottleneck power design. On the other hand the high speed backplane is highly optimized to have highest throughput by using current technology.

2.1 Power Backplane

2.1.1 Overview

The Comtel CO14N power backplane supports the following:

- 14 AdvancedTCA front board slots
- 14 AdvancedTCA RTM slots
- Two PEM slots
- Two slots for carrier board for Pigeon Point SHMM500
- Two slots for Shelf FRU Data and Telco Alarms board
- Slot for air intake temperature sensor

Note: Metallic test and ringing generator buses are available. Contact Comtel to get more information.

2.1.2 Power Channel segmentation

The power backplane has “A” and “B” power channels, each split in **five** sub-channels to guarantee no damage in case of a short circuit somewhere in the shelf on the load side. Each PEM feeds either channel “A” or “B” depending on position in the shelf. Power distribution is shown in Table 1:

Slot/FRU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	SFRU	SHMC	FAN
"A" Ch. (only PEM1)	2'	1'	3'	2'	4'	1'	3'	2'	4'	1'	3'	2'	4'	1'	5'	5'	5'
"B" Ch. (only PEM2)	2''	1''	3''	2''	4''	1''	3''	2''	4''	1''	3''	2''	4''	1''	5''	5''	5''

Table 1 Power Channels Among Logical Slots And FRUs

2.1.3 IPMB bus mapping

The power backplane has a bussed IPMB topology. There are two redundant IPMB busses shared among the intelligent FRUs on the backplane. The bus pull-up resistors are located on the shelf manager which is currently "active". The bussed topology is shown in the Figure 5:

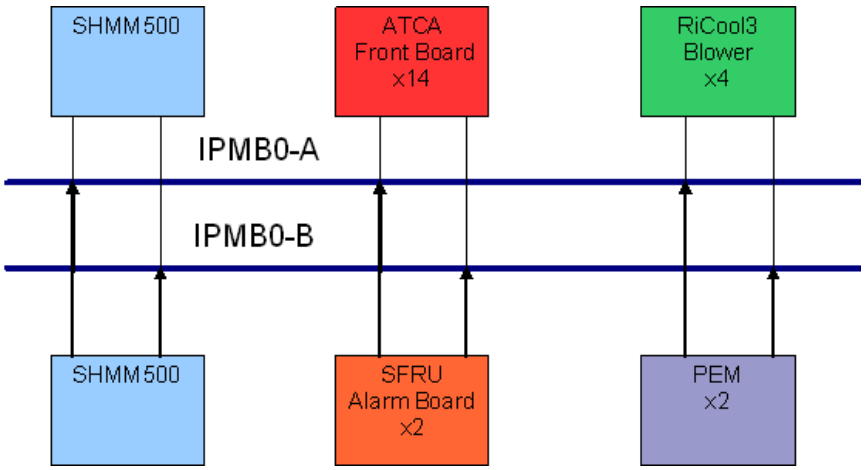


Figure 5 Bussed IPMB Topology

Each FRU has a unique hardware address. Mapping is given in the Table 2:

FRU(Looking from rear)	IPMB address	Hardware Address
SHMC left	10h	08h
SHMC right	12h	09h
SFRU left	14h	0Ah
SFRU right	18h	0Ch
PEM left	C0h	60h
PEM right	C2h	61h
Blower lower left	CEh	67h
Blower lower right	CCh	66h
Blower upper left	CAh	65h
Blower upper right	C8h	64h
ATCA logical slot 1	82h	41h
ATCA logical slot 2	84h	42h
ATCA logical slot 3	86h	43h

FRU(Looking from rear)	IPMB address	Hardware Address
ATCA logical slot 4	88h	44h
ATCA logical slot 5	8Ah	45h
ATCA logical slot 6	8Ch	46h
ATCA logical slot 7	8Eh	47h
ATCA logical slot 8	90h	48h
ATCA logical slot 9	92h	49h
ATCA logical slot 10	94h	4Ah
ATCA logical slot 11	96h	4Bh
ATCA logical slot 12	98h	4Ch
ATCA logical slot 13	9Ah	4Dh
ATCA logical slot 14	9Ch	4Eh

Table 2 Hardware Address Mapping

2.1.4 Logical to Physical slot mapping

In order to simplify the service of the shelf by service personnel the term Logical slot has been introduced. Physical slots are numbered from 1 to 14 from left to right, looking on the shelf from the front, independently from where the Hub slots are. By assigning logical slots, the Hub blades are forced to occupy the first slots, and other slots are numbered sequentially while moving away from Hubs. The mapping between logical slots and their physical positions is given in the Table 3:

Physical slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Logical slot	13	11	9	7	5	3	1	2	4	6	8	10	12	14

Table 3 Logical To Physical Slot Mapping

2.1.5 Logic ground

Figure 6 Logic Ground

Logic ground is used as reference for low voltage electronics and it is isolated from the chassis/shelf ground and 48v power lines. For EMI/EMC purpose it might be needed to connect the logic ground and shelf ground together.
To connect both grounds a screw with a conductive metal washer would be installed in this location (GND). To disconnect, remove screw as shown on the Figure 6.
Note: by default the GND screw is not installed at factory.

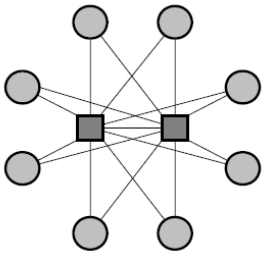
2.1.6 Metallic Test Bus and Ringing Generator Bus

Metallic test bus provides two pairs on the backplane. These can be used for metallic testing in the shelf in some telecom applications.
Ringing generator bus is shared among the slots and can be used to supply a Ring signal from an external generator to the front boards.

Both busses are available on the power backplane although the connector with Metallic test and ringing generator contact is not assembled by default.
Note: Contact Comtel for more information.

2.2 High speed Backplane

2.2.1 Base Interface



The Zone 2 Base Interface is used to support connections among Boards in the shelf. This interface supports 10/100/1000 BASE-T Ethernet. Connections are composed of four differential signal pairs (one row of ZD connector) called Base Channels. The topology of Base interface is Dual Star as shown in the Figure 7. It enables connection from multiple Node boards to dedicated Hub boards. The latter are always located in Logical slot 1 and 2. Base channel 1 is allocated to the shelf manager.

Figure 7 Dual Star Topology (rectangles - hub boards, circles - node boards)

2.2.2 Shelf manager Ethernet connections

Backplane P23 connector pin-out is implemented according to ECN001, Table 4:

Row#	Interface designation	AB		CD		EF		GH	
5	ShMC Port with ShMC cross connects	Tx1+	Tx1-	Rx1+	Rx1-	Tx2+	Tx2-	Rx2+	Rx2-
		Primary ShMC Cross-connect				Secondary ShMC Cross-connect			

Table 4 Cross-Connect Implementation On Comtel Backplanes

The Shelf Manager1 is connected to the dedicated Switch1 slot over the primary channel (rows ABCD) and to dedicated Switch2 slot over the secondary cross-connect channel. Same is applicable for Shelf Manager 2 connected to dedicated Switch2 slot and over the secondary channel with Switch1, as shown in the Figure 8:

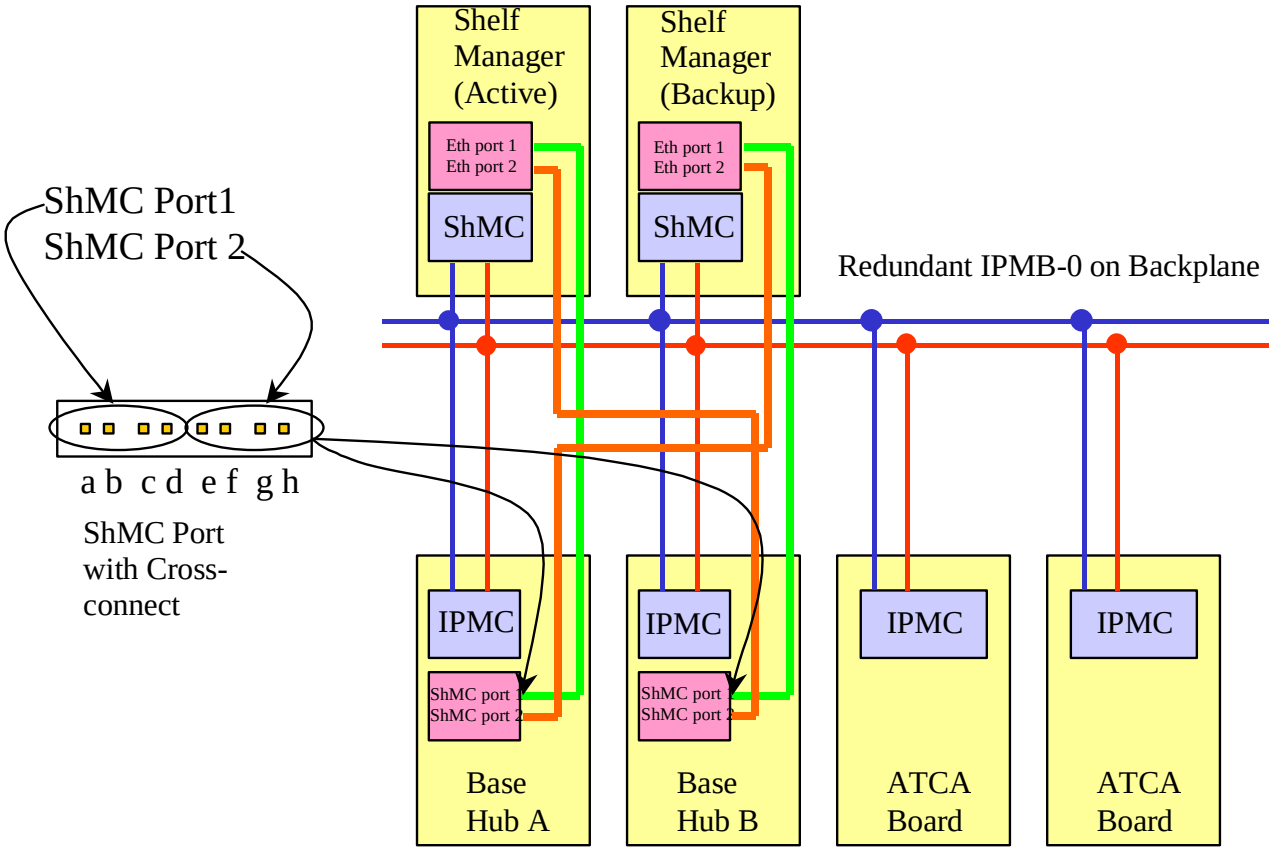


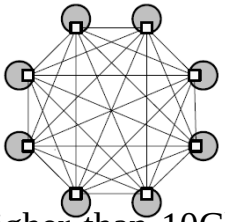
Figure 8 Shelf Manager Ethernet Port Cross-Connect Implementation

2.2.3 Fabric Interface

Fabric interface is mostly used for high throughput Data transport and may utilize interfaces such as 1/10/40 Gigabit Ethernet, PCI-Express, Serial RapidIO, etc. The Fabric Interface is comprised of 13 Channels providing connectivity among the front boards. Each channel occupies two rows of ZD connector resulting in 8 pairs per channel. The shelf can be assembled with either Dual Star or Full Mesh version of backplane. The Full mesh topology does not use a central switch fabric. All slots are identical from connection point of view as shown in the Figure 9:

Figure 9 Fabric Topology

(there are no dedicated hub boards)



Backplane routing has been optimized to achieve data rates higher than 10Gbps per pair.

The high-speed interconnect has been simulated with different drivers at 6.25Gbps and 10Gbps. The result of the simulation with Xilinx VirtexII-Pro driver and receiver with equalizer at 10Gbps is shown in the Figure 10 and Figure 11, presenting signals at the input of the receiver and at the output of the equalizer.

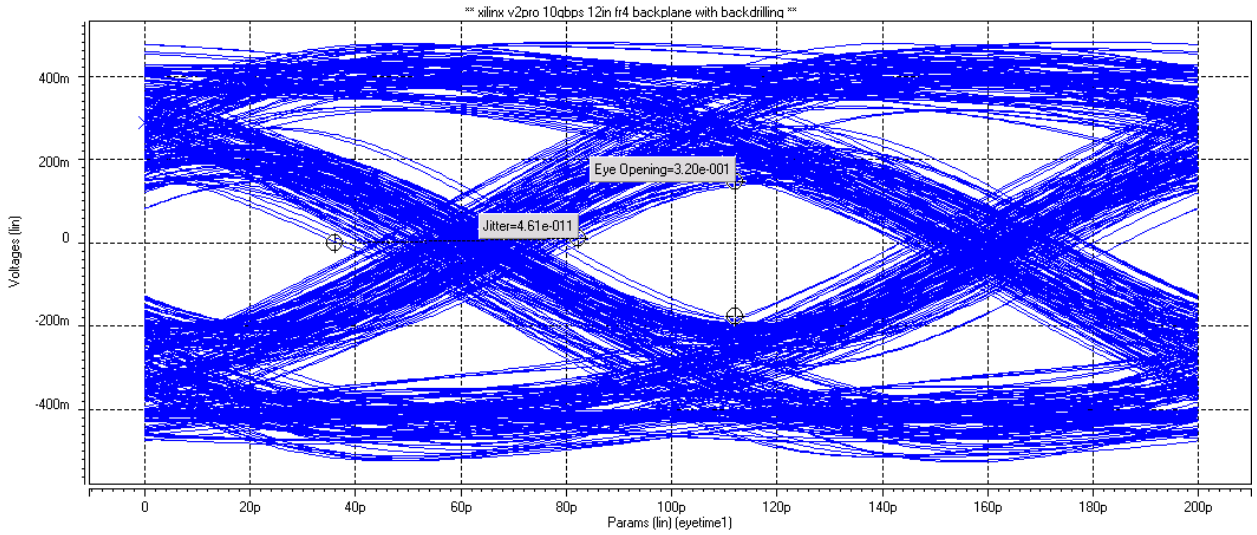


Figure 10 Eye Diagram At 10Gbps Simulated At The Input Of Virtex2-Pro Receiver

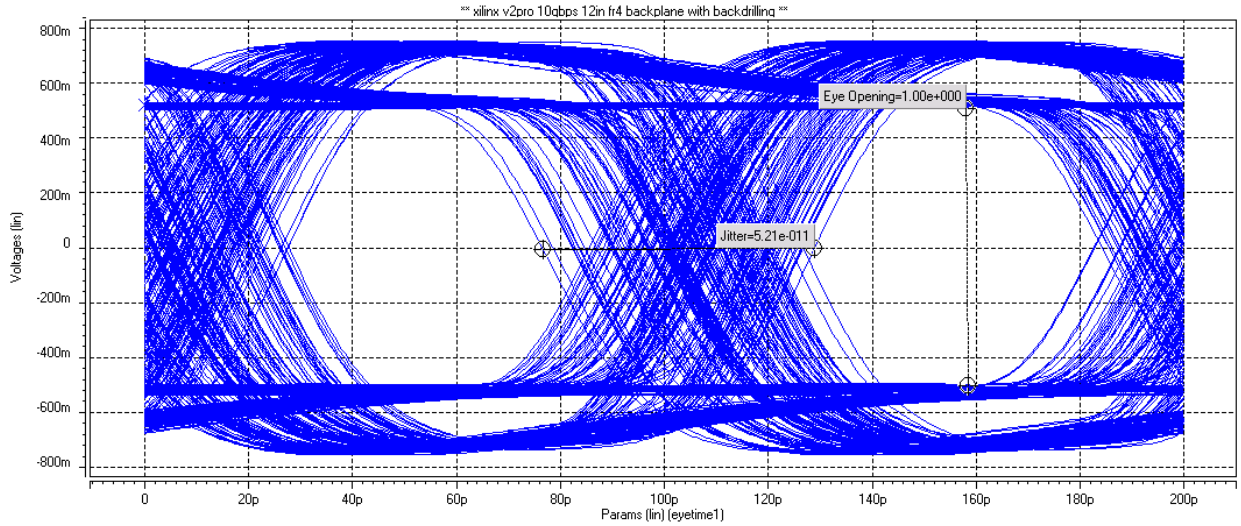


Figure 11 Eye diagram At 10Gbps Simulated At Output Of Virtex2-Pro Equalizer

2.2.4 Update channel

The Update Channel Interface is comprised of 10 differential signal pairs in a point to point connection between two adjacent physical slots. It can be used for general purpose high speed link between two boards. Update channel connections are shown in the Table 5:

Physical slot	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Logical slot	**13**	**11**	**9**	**7**	**5**	**3**	**1**	**2**	**4**	**6**	**8**	**10**	**12**	**14**
Update channel	◄►		◄►		◄►		◄►		◄►		◄►		◄►	

Table 5 Update Channel Connections

2.2.5 Synchronization Clock Interface

The Synchronization Clock interface provides a set of clock buses to enable applications that require the exchange of synchronous timing information among multiple Boards in a Shelf. Clock lines are bussed between all slots and terminated on both ends.

3 Cable trays

A shelf can be optionally equipped with front or rear cable trays that are shown on the Figure 12. They help to guide and fasten cables and cords connected to the shelf.

Figure 12 Front (Left) And Rear (Right) Cable Trays

Figure 13 CO14N With Front And Rear Cable Trays

Note: Contact Comtel to get more information.

4 Air Filter

The air filter is required to provide:

- filtration of intake air from dust particles
- additional static pressure to achieve uniform airflow

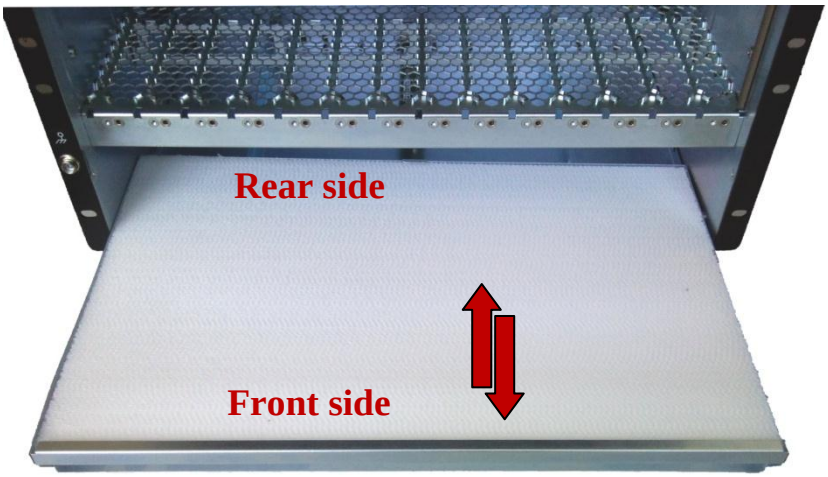


Figure 14 Air Filter

Air Filter Removal:

Using the lower flange as a handle, gently push in and tilt down. Remove. (Figure 14)

Air Filter Presence Sensors:
Redundant "presence" sensors are shown in the Figure 15. These sensors monitor the filter replacing event. The shelf manager can be configured to notify the system manager about the date recommended for scheduled maintenance or replacement.

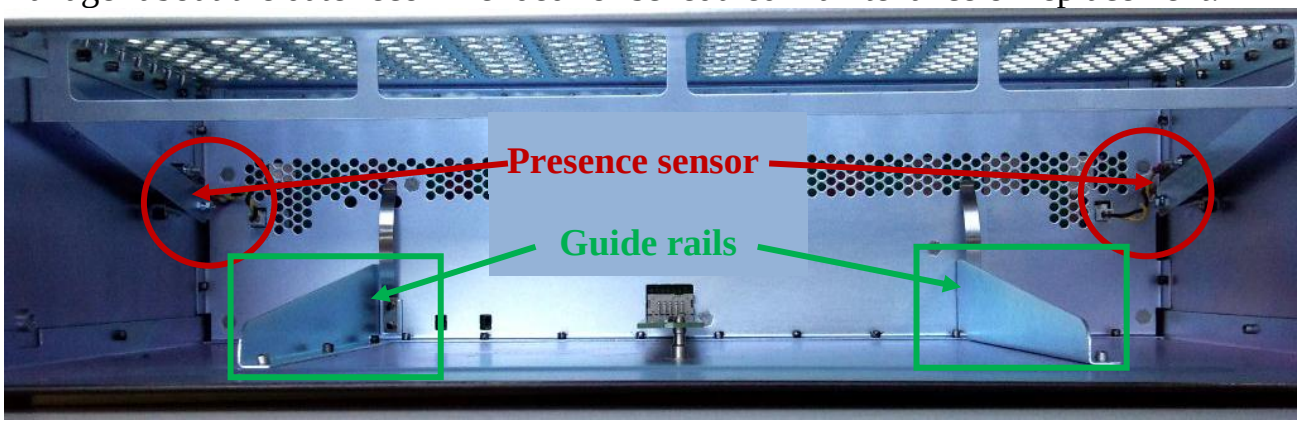


Figure 15 Air Filter Presence Sensor And Guide Rails

Air Filter Insertion: *Care should be used when inserting air filter to prevent damage to sensors.* Rest filter on guide rails and slide filter in until it gently contacts springs. Tilt up from front until it locks under card cage. Pull forward to ensure it is locked in place.

5 Shelf FRU Data and Telco Alarms board

The Shelf FRU Data and Telco Alarms board is shown in the Figure 16 and features:

- Storing Shelf FRU Data information

- TELCO Alarms indicator (LEDs)
- TELCO Contacts

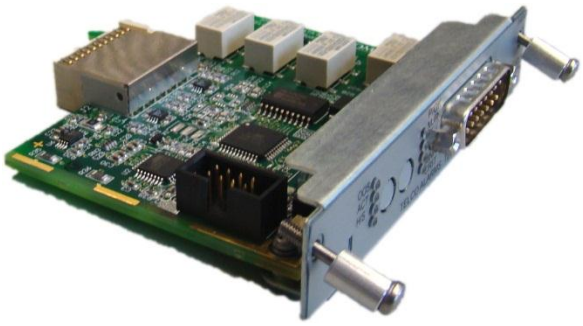


Figure 16 SFRU Data And TELCO Alarms Board

This unit contains electronic components that are sensitive to static electricity. All electronic boards in this shelf are protected by Shelf Ground. It is recommended that anti static wrist straps be worn and connected to a known good shelf ground connection when servicing.

5.1 Overview

The block diagram for the Shelf FRU Data and Telco Alarms board is shown in the Figure 17:

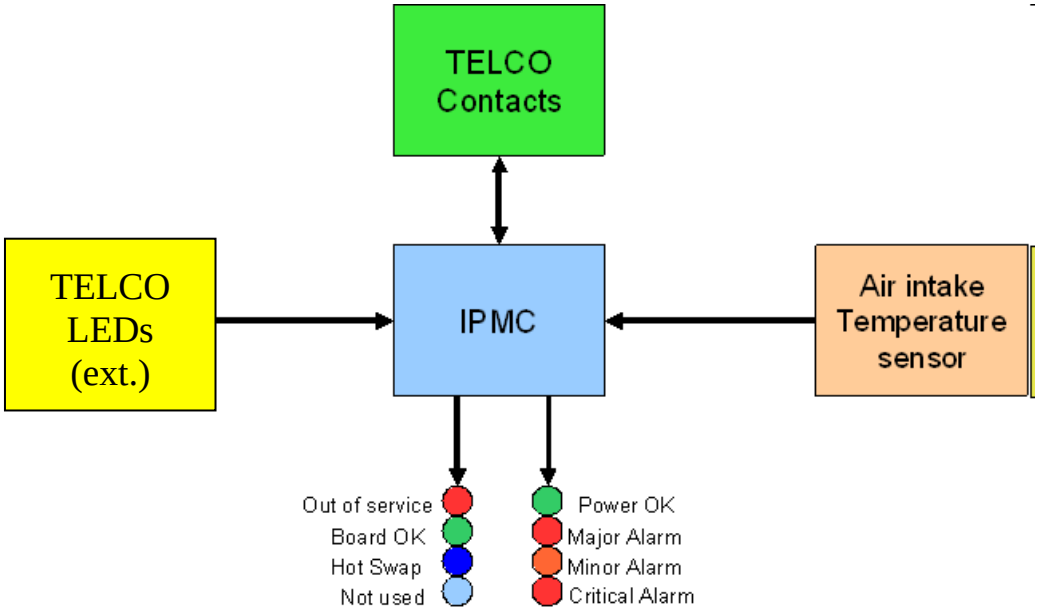


Figure 17 SFRU Data And TELCO Alarms Board Block Diagram

Up to two Shelf FRU Data and Telco Alarms boards can be installed in the shelf in order to provide redundancy storage of FRU Data information.

5.2 Front panel

The front panel is shown in the Figure 18:

Figure 18 SFRU Board Front Panel

There are two rows of LEDs. The left row indicates the status of IPMC and the right row is Telco Alarms display. The LEDs are:

Abbr.	Name	LED	State	Purpose
OOS	Out Of Service	Red ●	Off Blinking On	Normal Operation Lost connection to ShMC or no IPMB bus Incorrect hardware address or FRU data corruption
ACT	Active	Green ●	On	Normal operation, IPMC is in M4 state
H/S	Hot Swap	Blue ●	Off Blinking On	Normal Operation (if ACT is On), IPMC stuck in M3 state (if ACT is Off) Hot swap circuit active (wait) Hot swap complete (ready to remove)
POK	Power OK	Green ●	On	Input power to shelf is within limits
MJR	Major Alarm	Red ●	On	Major alarm detected in shelf
MNR	Minor Alarm	Amber ●	On	Minor alarm detected in shelf
CRIT	Critical Alarm	Red ●	On	Critical alarm detected in shelf

The D-SUB15 connector provides Telco contact interface. Pinout is shown in Table 6:

Pin	Name	Pin	Name
1	Minor Reset +	9	Minor Alarm NC
2	Minor Reset -	10	Minor Alarm COM
3	Major Reset +	11	Major Alarm NO
4	Major Reset -	12	Major Alarm NC
5	Critical Alarm NO	13	Major Alarm COM
6	Critical Alarm NC	14	Power NO
7	Critical Alarm COM	15	Power COM
8	Minor Alarm NO		

Table 6 Telco Contacts Pinout

5.3 Software architecture

The board is based on IPMI and PICMG specifications compliant IPMC controller. The IPMC exposes three FRUs:

- FRU ID 0 – SFRU Alarm Board
- FRU ID 1 – Shelf FRU Data
- FRU ID 2 – Telco Alarms

The Shelf FRU information is accessible via FRU ID 1. It contains different sections each specifying a piece of the shelf information:

- **Chassis Info**
- **Board Info**
- **Product Info**
- **Address table** specifies FRUs (and their FRU IDs) to hardware address mapping
- **Power Distribution** specifies current capability of the shelf, available power feeds and their mapping on FRUs
- **Power Management** specifies maximum power capability and activation readiness of each FRU supported in the shelf
- **Backplane Connectivity** specifies how Base, Fabric, Update and ShMC cross connect channels are routed on the backplane
- **Shelf Manager IP Connection** specifies IP-address, Gateway and Netmask for the primary ShMC Ethernet port

The IPMC manages the Telco Alarms interface as well. This interface provides a simple way to indicate any pre-programmed unhealthy state somewhere in the shelf.
The shelf or system managers are responsible to receive events from sensors on FRUs and then to process these with PEF (Platform Event Filtering) mechanism. The system integrator can assign filter rules to set any kind of alarm severity in case if any FRU sends expected events. Comtel shelves are pre-configured to set alarms on temperature and fan spinning events assertion.
Sensors provided by IPMC are given in the Table 7:

Sensor Name	Number/LUN	EntityID/Entity Instance	Sensor Type code	Description
IPMB 0 Status	85h / 0h	F1h/60h	IPMB Link F1h	System
HotSwap	84h / 0h	F1h/60h	Hot Swap F0h	System
Ejector State	7Fh / 0h	F1h/60h	Button 14h	System
IPMC Status	01h / 3h	F1h/60h	OEM D5h	System
FW Revision ISC	88h / 0h	F1h/60h	OEM D6h	System
HS Shelf FRU	83h / 0h	F2h / 60h	Hot Swap F0h	System
HS Telco Alarm	70h / 0h	F3h / 60h	Hot Swap F0h	System
Board Temp 0	00h / 1h	F1h/60h	Temperature 01h	Redundant on board temperature sensor
Board Temp 1	01h / 1h	F1h/60h	Temperature 01h	Redundant on board temperature sensor
Ext. Temp.	0Bh / 1h	F1h/60h	Temperature 01h	Air intake temperature sensor

Sensor Name	Number/LUN	EntityID/Entity Instance	Sensor Type code	Description
Air Filter SW 1	01h / 0h	F1h/60h	Button 14h	Air filter Presence sensor
Air Filter SW 2	02h / 0h	F1h/60h	Button 14h	Air filter Presence sensor
Telco Alarms	7Dh / 0h	F3h/60h	TELCO Alarm Input F4h	Major and Minor Reset Input sensors

Table 7 Sensors On The SFRU Data And TELCO Alarms Board

The board also has access to shelf resources such as the Air Filter presence sensor, Intake Air temperature sensors and Telco LEDs that are located on external Telco Alarms display board underneath the air filter frame (see Figure 19).

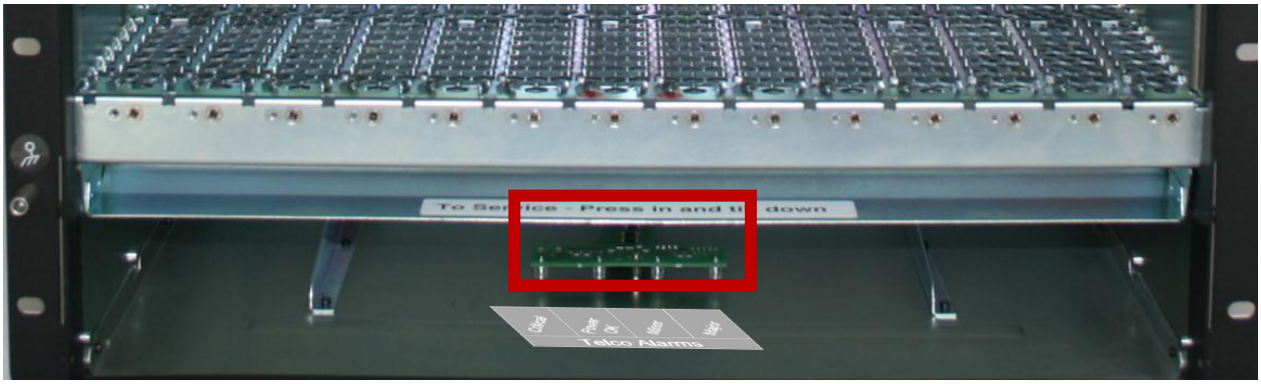


Figure 19 External Telco Alarms Display Board

The display board exposes four Telco LEDs (from left to right): Critical Alarm, Power OK, Minor Alarm, Major Alarm. By default the Power OK LED is configured to be ON when the corresponding SFRU boards gets management power, however this LED can be disabled by setting a jumper JP1, see Table 8.

Jumper Name/State	Populated	Not Populated	Factory defaults
JP1	PowerOK LED is Disabled	PowerOK LED is Enabled	Not Populated
JP2	Reserved	Reserved	Not Populated

Table 8 Jumper Settings On Display Board

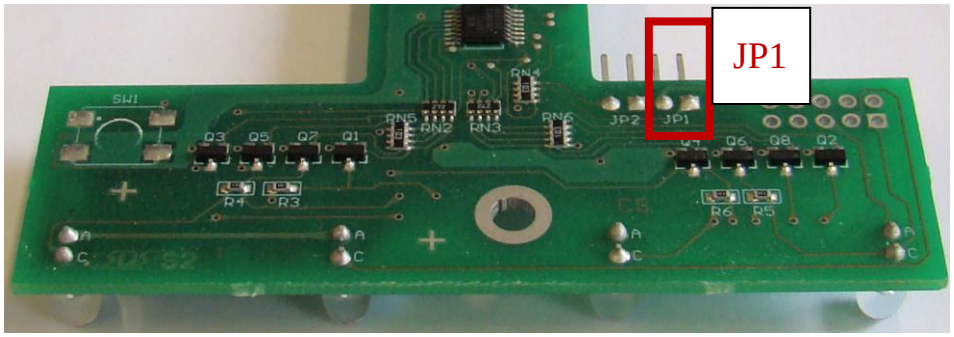


Figure 20 Jumpers On Display Board

Telco Alarms LEDs can be also disabled by executing the following comman in the shelf manager console:

```
clia sendcmd <SFRU board IPMB address> 30 D8 <setting>
```

Where

`<SFRU board IPMB address>` - 0x14 for the SFRU1 and 0x18 for the SFRU2,

`<setting>`: 01 – Enable Telco Alarms LED on the display board and
00 – Disable Telco Alarms LED on the display board

To check the status of these LED, execute the command:

```
clia sendcmd <SFRU board IPMB address> 30 D8
```

Note: Telco Alarms Cut-off functionality is optionally supported. Contact Comtel for more information.

5.4 Setting Shelf Manager IP-address (obsolete)

Note: This functionality is not supported anymore, however is present on some old chassis that have been produced until middle of 2011.

During start up the IPMC reads out the SFRU Data and searches for the first Shelf Manager IP Connection. It takes the IP-address and modifies the lower nibbles of third and fourth bytes of IP-address based on rotary switch setting. The shelf manager will get already modified IP address, for example C0.A8.0X.AY where X and Y are values set on rotary switches (hex number pointed with the arrow on a rotary switch).

5.5 Default Shelf Manager IP-address

The IP-address of the Shelf manager is stored in shelf FRU data in the *Shelf Manager IP Connection* section. Factory default address is **192.168.0.171**.

5.6 Telco Alarms

The board provides Telco Alarms interface – Telco relay contacts and LED indication at the front panel of the board. The relay contacts can withstand maximum 72VDC or 1 Ampere. Major and minor alarms can be reset via dedicated reset inputs by applying voltage in range 4V up to 72V. The current will not exceed 10 mA.

6 PEM

The Power Entry Module is shown in Figure 21 and features the following:

- Input nominal current 105A@48VDC and 84A@60VDC via 4 studs
- Input nominal voltage -48/-60 VDC
- Input voltage operating range - 36-72VDC
- Splitting input power into five sub channels
- Filtering on each channel
- Fusing on each channel on both lines (-/minus and RTN/return) with replaceable fuses
- Fuse failure monitoring via sensors and LEDs at front panel

CAUTION:

*** DOUBLE POLE FUSING.**

*** Input voltage to this unit is classed as hazardous connection.**

*** Disconnect input power from PEM feed prior to service.**

This unit contains electronic components that are sensitive to static electricity. All electronic boards in this shelf are protected by Shelf Ground. It is recommended that anti static wrist straps be worn and connected to a known good shelf ground connection when servicing.

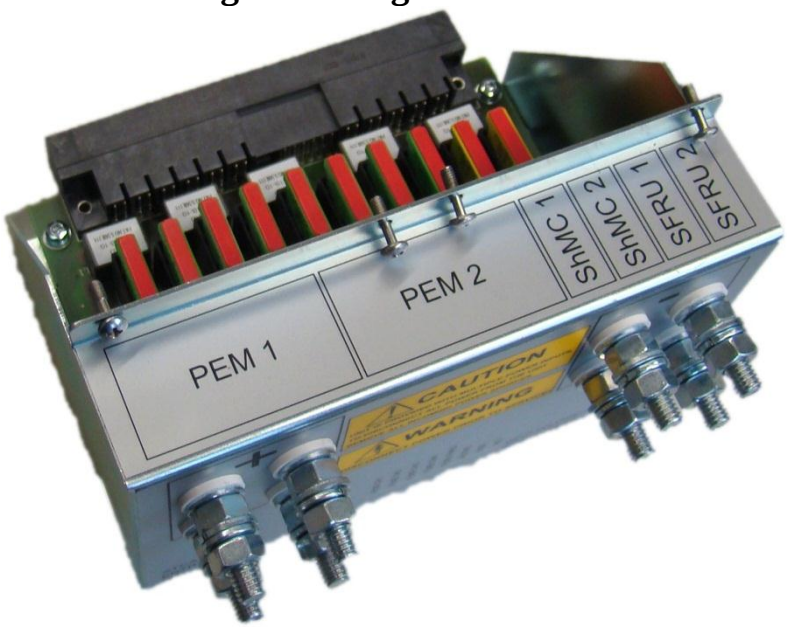


Figure 21 Power Entry Module

6.1 Overview

The block diagram of the PEM is shown in Figure 22.

The shelf can be used either with battery power plant or with external power supply. The input power will be split into five sub channels and then fused on each line in order to prevent catastrophic failure on the backplane that can happen in case of short cut event. The following filter circuitry helps to reduce noise on power lines.

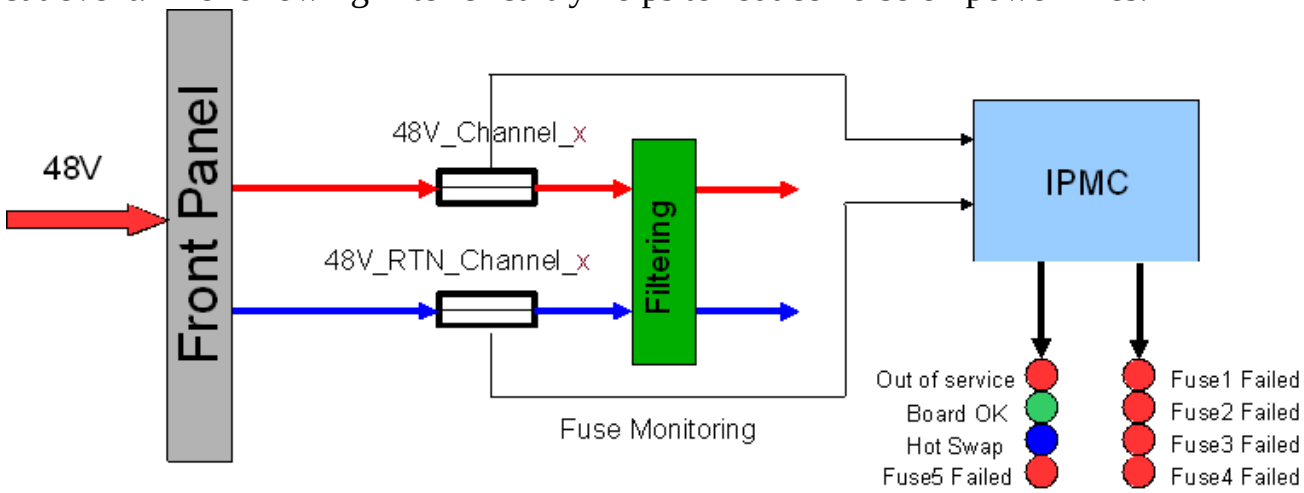


Figure 22 PEM Block Diagram

Note: hot swap functionality is implemented only for the management controller (IPMC) to ensure data consistency during communication with the shelf manager. A PEM can be plugged out only in case when input power is disconnected. This allows to service one PEM while second supplies power to the complete system.

Note: Maximum current shall not exceed 140 Amp.

6.2 PEM Front panel

The PEM front panel is shown in Figure 23.

The power studs are separated in two groups. The left group is intended for Positive (Return Voltage) wire and the right group is for Negative ("-" Voltage) wire.

Figure 23 Power Entry Module Front Panel

The LEDS are:

Abbr.	Name	LED	State	Purpose
REV. VOLTAGE	Reverse Voltage	Red ●	Off On	Normal Operation Input voltage polarity reversed
FUSE CH1	Fuse 1	Red ●	Off On Blinking	Normal Operation Fuse blown or absent Input power lost
FUSE CH2	Fuse 2	Red ●	Off On Blinking	Normal Operation Fuse blown or absent Input power lost
FUSE CH3	Fuse 3	Red ●	Off On Blinking	Normal Operation Fuse blown or absent Input power lost
FUSE CH4	Fuse 4	Red ●	Off On Blinking	Normal Operation Fuse blown or absent Input power lost
FUSE FANS	Fuse 5	Red ●	Off On Blinking	Normal Operation Fuse blown or absent Input power lost
ACTIVE	Active	Green ●	On	Normal operation, IPMC is in M4 state
OOS	Out of service	Red ●	Off Blinking On	Normal Operation Lost connection to ShMC or no IPMB bus Incorrect hardware address or FRU data corruption
H/S	Hot Swap	Blue ●	Off Blinking On	Normal Operation (if ACT is On), IPMC stuck in M3 state (if ACT is Off) Hot swap circuit active (wait) Hot swap complete (ready to remove)

There is a special condition: all five fuse LEDs will be **simultaneously** blinking if input power is lost on this particular PEM.

6.3 Software architecture

The board is based on IPMI and PICMG specifications compliant IPMC controller. The IPMC exposes one FRU:

- FRU ID 0 – CO14N PEM

The IPMC is responsible for communication with a shelf manager. Furthermore it monitors fuse status and reflects this information as IPMI sensors and LEDs at front panel. The sensors on the PEM are given in the Table 9:

Sensor Name	Number/LUN	EntityID/Entity Instance	Sensor Type code	Description
IPMB 0 Status	85h / 0h	15h/60h	IPMB Link F1h	System
HotSwap	84h / 0h	15h/60h	Hot Swap F0h	System
IPMC Status	01h / 3h	15h/60h	OEM D5h	System
FW Revision ISC	88h / 0h	15h/60h	OEM D6h	System
Board Temp 0	00h / 1h	15h/60h	Temperature 01h	Redundant on board temperature sensor
Board Temp 1	01h / 1h	15h/60h	Temperature 01h	Redundant on board temperature sensor
VMG1	06h / 0h	15h/60h	Voltage 02h	Redundant 3.3V in the shelf (generated on carrier board)
VMG2	07h / 0h	15h/60h	Voltage 02h	Redundant 3.3V in the shelf (generated on carrier board)
Failure pwr ch 1	01h / 0h	15h/60h	OEM 2Dh	"Fuses on power channel 1 are not OK" sensor
Failure pwr ch 2	02h / 0h	15h/60h	OEM 2Dh	"Fuses on power channel 2 are not OK" sensor
Failure pwr ch 3	03h / 0h	15h/60h	OEM 2Dh	"Fuses on power channel 3 are not OK" sensor
Failure pwr ch 4	04h / 0h	15h/60h	OEM 2Dh	"Fuses on power channel 4 are not OK" sensor
Failure pwr ch F	05h / 0h	15h/60h	OEM 2Dh	"Fuses on power channel F are not OK" sensor
Input power	08h / 0h	15h/60h	Power Unit 09h	Input power lost

Table 9 Sensors On The Power Entry Module

6.4 Installation and service

To connect external power supply to the shelf two-hole lugs must be used. Use Thomas & Betts PN 256-30695-1225 as shown in

Figure 24 or equivalent:

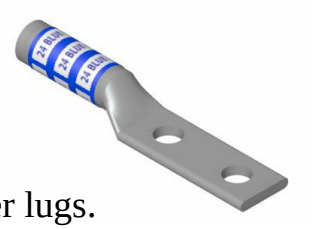


Figure 24 Required PEM Power Lug

Rubber boots are supplied with the shelf. Use these to cover power lugs.

WARNING: Always disconnect input power prior to servicing PEM. Disturbed current through the backplane connector will lead to high voltage spikes or arc discharge thus connector/backplane damage.

Note: caution must be taken when working near to the PEM power studs to avoid personnel injury. The shelf operating voltage range covers TNV-2 voltages (60-80V). This voltage is considered hazardous.

The service action may be needed when some fuses have blown. **Prior to servicing be sure to disconnect power feeds to PEM.** To replace the fuses the PEM has to be unplugged. Always replace a compliment fuse to the blown one on given power channel (i.e. -48V and RTN fuses have to be replaced).

6.5 Crimping Instruction

Before crimping, slide rubber boot along each wire (red on "-" and black on "+"). Follow the guidelines:

- Strip the insulation from cable to the length shown in table (on reverse side). Be careful not to nick cable strands which may later result in stands breaking
- Cable end should be clean: wire brush or clean with emery cloth if necessary. Insert cable into connector until it stops. The insertion length must approximate the stripped length of cable
- Insert connector in die and compress between the markings beginning near the tongue of the connector. Table on reverse side shows installing die and the number of compressions required for each die connector combination

Note: Using improper installing die may result in a defective connection.
DO NOT CRIMP ON ENERGIZED WIRES!

- After crimping, remove all sharp edges, flash or burrs

- Insulating methods shown in Table 10

STRIP LENGTH (INCHES)	WIRE SIZE		Colour code & die code	NUMBER OF COMPRESSIONS												FLEX DIE		FLEX CONDUCTOR CLASSIFICATION
				HAND TOOLS					HYDRAULIC HEADS				BATTERY OPERATED TOOLS		TBM8-750 TBM8-750BSCR TBM8-750M-1			
	/24 WIRE	CU. CODE		TBM21E TBM25S TBM20S	** TBM4S	TBM 5	TBM 6	TBM 8	TBM6H 6TON	12 TON	15 TON	40 TON	TBM6BSCR TBM61500BSCR TBM62BSCR	BPLT14BSCR TBM14BSCR		6 TON	14/15	
¾	61/24	◊ #6 STRD & SOLID	BLUE 24	4	2	2	2	2	2	2	2	2	2	2	1	TBM62X TBM6224X	15500X 15522X	#5 G, H, I, K

Table 10 Crimping Insulating Methods

Note: When using other lugs - refer to installation instruction of lugs manufacturer.

6.6 Powering the shelf

After the power cable is crimped it may be connected to the PEMs as directed:

- Make sure that neither PEM nor power cord are energized
- Remove the first set of nuts and lock washers from each PEM's stud
- Install each double lug on two studs either horizontally or vertically
- Do not apply torque more than 3.8 Nm (33.62 lbf.in)
- Install prior removed nuts and washers
- Slide rubber boots (red on "-" and black on "+") along cable to cover the nuts

The above stated guidelines are partially shown in the Figure 25

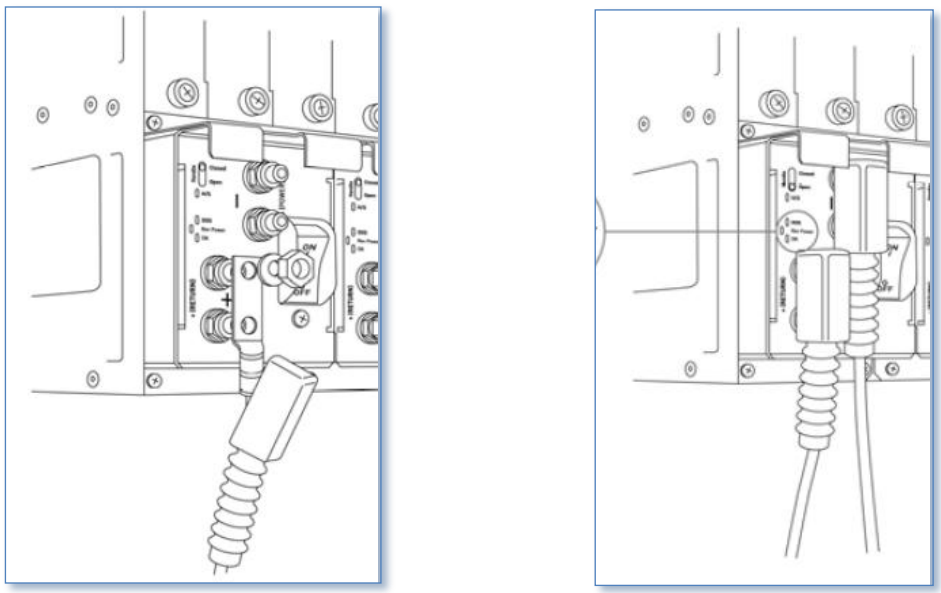


Figure 25 Example Of Double Lug Installation And Rubber Boots

7 Carrier board for Pigeon Point shelf manager

The carrier board is shown in Figure 26 and features the following:

- Supports Pigeon Point SHMM500 shelf manager
- RS-232 port at front panel (via RJ-45 connector)
- Ethernet channel "0" demultiplexor (Eth0 is routed to front panel or backplane)
- Hot swap actuator

Figure 26 Carrier Board

This unit contains electronic components that are sensitive to static electricity. All electronic boards in this shelf are protected by Shelf Ground. It is recommended that anti static wrist straps be worn and connected to a known good shelf ground connection when servicing.

7.1 Overview

Carrier board block diagram shown in Figure 27

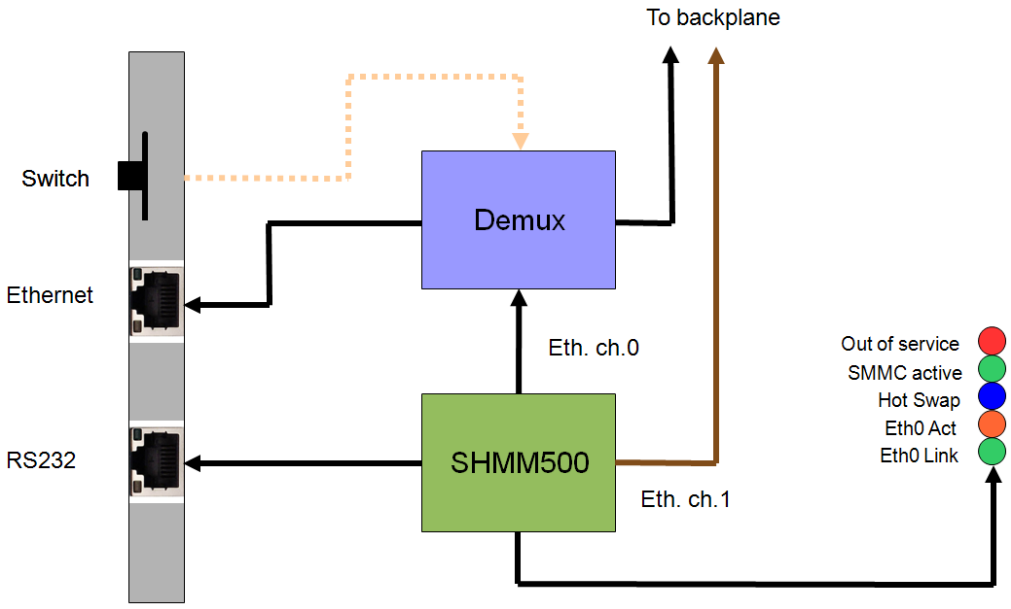


Figure 27 Carrier Board Block Diagram

The shelf manager has two Ethernet channels. The first is demuxed and can be routed either to the front panel connector (service action) or to the backplane (normal operation). The switch at front panel enables selecting between two routing options.

7.2 Front Panel

Front panel shown in Figure 28:

Figure 28 Carrier Board Front Panel

The LEDs are:

Abbr.	Name	LED	State	Purpose
ACT	Active	Green	On Blinking	Active Shelf Manager (in M4 state) Standby Shelf Manager (in M4 state)
OOS	Out Of Service	Red	Off On	Normal Operation Linux reboot or other failures
H/S	Hot Swap	Blue	Off Blinking On	Normal Operation Hot swap circuit active (wait) Hot swap complete (ready to remove)
Ethernet	Port 0	Amber	On	10/100 Mbit link for Ethernet Port 0
Ethernet	Port 0	Green	On	Link/Act for Ethernet Port 0
10/100	Port 1	Amber	On	10/100 Mbit link for Ethernet Port 1
L/A	Port 1	Green	On	Link/Act for Ethernet Port 1

Push Switch - Allows user to choose how to route the Ethernet port "0".

Pushed (recessed) switch maps the Ethernet channel "0" of SHMM-500 to backplane and further to ATCA Hubs
Pulled (flush) switch maps the Ethernet channel "0" of SHMM-500 to RJ-45 connector at front panel

RS-232 connector is given in Table 11. Two pin assignments are possible:
Note: Factory default is Cisco pinout.

	RS-232D pinout			Cisco pinout		
Pin	Name	Dir	Description	Name	Dir	Description
1	DSR/RI	←	Data Set Ready/ Ring	RTS		
2	CD	←	Carrier Detect	DTR		
3	DTR	→	Data Terminal Ready	TXD	→	Transmit Data
4	GND	–	GROUND	GND	–	GROUND
5	RXD	←	Receive Data	GND	–	GROUND
6	TXD	→	Transmit Data	RXD	←	Receive Data
7	CTS	←	Clear to Send	DSR		
8	RTS	→	Request to Send	CTS		

Table 11 RS-232 Port Pinout

Note: Remove battery saver prior to using shelf.

7.3 Software architecture

Refer to Pigeon Point documentation for SHMM500 software architecture details.
Comtel specific settings are stored in these locations:

- /etc/shelfman.conf.comtel – Comtel configuration file
- /etc/rc.comtel – Comtel script file
- /var/nvdata/carrier_data – Comtel carrier hardware description file
- /var/nvdata/carrier_sdrs – Comtel carrier SDR
- /var/nvdata/chassis_data – Comtel shelf specific settings

8 Blowers

The shelf includes four RiCool3 blower units at the top. RiCool3 is the third generation of the blower design for that chassis. The airflow and noise parameters have been significantly optimized in comparison with predecessor.
RiCool3 is shown in the Figure 29 and features:

- Airflow: 320 m³/h (188CFM)
- Static Pressure: 897 Pa (3.6" H2O)
- Noise: 59 dB(A)@70% speed
- Operating voltage range: 36V-72V DC
- Dual Input Fusing

Figure 29 RiCool3 Blower

This unit contains electronic components that are sensitive to static electricity. All electronic boards in this shelf are protected by Shelf Ground. It is recommended that anti static wrist straps be worn and connected to a known good shelf ground connection when servicing.

Caution. Rotating fan blades. Can cause minor injury or cut. Keep hands clear when servicing. Allow time for fan blades to slow to a stop before fully removing.

8.1 Overview

The block diagram of the carrier board is shown in the Figure 30:

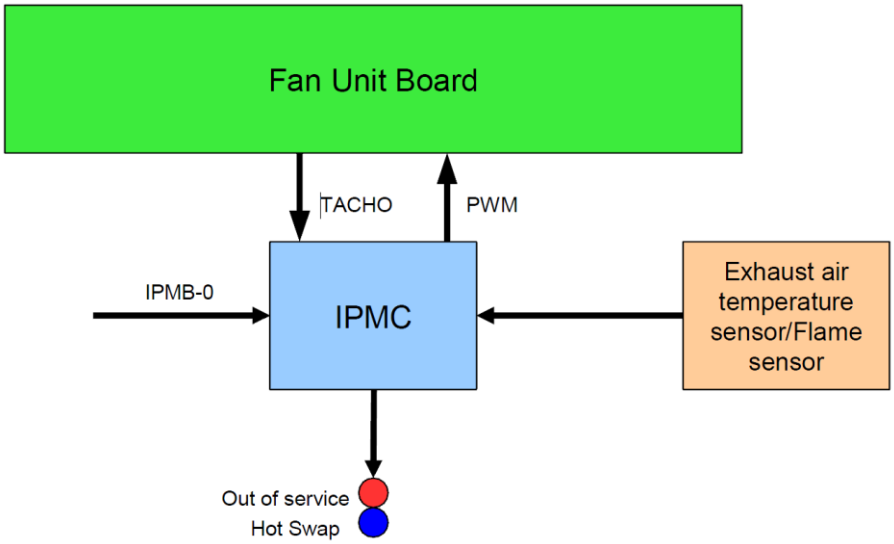


Figure 30 Blower Block Diagram

The IPMC and fan unit are located on different PCBs and furthermore have electrical isolation. The IPMC monitors permanently tachometer sensor as well as temperature sensor. The shelf manager can set the rotation speed by using standard PICMG compliant command.

8.2 Front panel

The front panel is shown in the Figure 31.
There are two LEDs:

- **HS** – mandatory hot swap LED
- **OOS** – mandatory Out of Service LED

Under normal operation both LEDs do not light.

Figure 31 Blower Front Panel

A hot swap handle is not implemented. For service, pull the unit out without software deactivation.

8.3 Software architecture

The board is based on IPMI and PICMG specifications compliant IPMC controller.

The IPMC exposes one FRU:

- FRU ID 0 – FAN MODULE

The sensors on the blower unit are given in the Table 12:

Sensor Name	Number/LUN	EntityID/Entity Instance	Sensor Type code	Description
IPMB 0 Status	85h / 0h	1Eh/60h	IPMB Link F1h	System
Fan HotSwap	84h / 0h	1Eh/60h	Hot Swap F0h	System
FAN IPMC	01h / 3h	1Eh/60h	OEM D5h	System
FW Revision ISC	88h / 0h	1Eh/60h	OEM D6h	System
Fan Temperature	00h / 1h	1Eh/60h	Temperature 01h	Redundant on board temperature sensor
Exhaust Temp	04h / 0h	1Eh/60h	Temperature 01h	Exhaust temperature sensor
Fan RPM	01h / 0h	1Eh/60h	Fan 04h	Redundant 3.3V in the shelf (generated on carrier board)
Flame Sensor	03h / 0h	1Eh/60h	OEM D2h	Flame sensor
Fan Alarm	02h / 0h	1Eh/60h	OEM D2h	Fan alarm sensor

Table 12 Sensors On The Blower Unit

Appendix A - Standards

Organization	Standard	Description
PICMG	PICMG 3.0 R2.0	Advanced Telecommunications Computing Architecture
UL	UL/EN/IEC 60950	Information Technology Equipment - Safety – Part 1: General Requirements
EN	EN55024	Information Technology Equipment Immunity Characteristics – limits and Methods of Measurement
Telcordia	FR-2063	NEBS Family of Requirements
Telcordia	SR-3580	NEBS Criteria Levels
Telcordia	GR-63-CORE	NEBS Requirements, Physical Protection
Telcordia	GR-78-CORE	General Requirements for the Physical Design and Manufacture of Telecommunications Products and Equipment
Telcordia	GR-1089-CORE	Electromagnetic Compatibility & Electrical Safety
Telcordia	GR-2914-CORE	Human Factors Requirements for Equipment to Improve Network Integrity
Telcordia	GR-3028	Thermal Management in Telecommunications Central Offices
ETSI	ETS 300 019-1-0	Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 1-0 Classification of Environmental Conditions - Introduction
ETSI	ETS 300 019-1-1	Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 1-1 Classification of Environmental Conditions – Storage, Class 1.1
ETSI	ETS 300 019-1-2	Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 1-2 Classification of Environmental Conditions – Transportation, Class 2.3
ETSI	ETS 300 019-1-3	Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 1-3 Classification of Environmental Conditions – Stationary Use at Weather protected Locations, Class 3.1E
ETSI	ETS 300 119-1	European Telecommunications Standard for Equipment Practice, Part 1, Introduction & Terminology
ETSI	ETS 300 119-2	European Telecommunications Standard for Equipment Practice, Part 2, Engineering requirements for Racks & Cabinets
ETSI	ETS 300 119-3	European Telecommunications Standard for Equipment Practice, Part 3, Engineering requirements for Miscellaneous Racks & Cabinets
ETSI	ETS 300 119-4	European Telecommunications Standard for Equipment Practice, Part 4, Engineering requirements for Subracks in Miscellaneous Racks & Cabinets
ETSI	ETS 300 753	Acoustic Notice emitted by Telecommunications Equipment
ETSI	ETS 300 132	Power Supply Interface at the Input to Telecommunications Equipment
ETSI	ETS 300 253	Earthing and Bonding Configuration Inside Telecommunications Centres
EMC	ETSI EN 300 386 (Europe)	
EMC	FCC part 15 (US)	

Appendix B - Comtel Configuration Files

```
# cat /etc/shelfman.conf.comtel
CARRIER = COMTEL
HPDL=TRUE
MIN_SHELF_FRUS = 1
LOCAL_SHELF_FRU = FALSE
EXIT_IF_NO_SHELF_FRU = FALSE
MIN_FAN_LEVEL = 20
INITIAL_FAN_LEVEL = 100
RMCP_NET_ADAPTER2 = eth1
SWITCHOVER_ON_HANDLE_OPEN = TRUE
ALLOW_CLEARING_CRITICAL_ALARM=TRUE
REDUNDANCY_NET_ADAPTER = usb0
RMCP_NET_ADAPTER = eth0
FAN_FULL_SPEED_DELAY=30
SHELF_FRU_IPMB_SOURCE1 = 0x14
SHELF_FRU_IPMB_SOURCE2 = 0x18
FAN_LEVEL_STEP_DOWN = 10
FAN_LEVEL_STEP_UP = 10
SWITCHOVER_ON_HANDLE_OPEN=TRUE
CARRIER_OPTIONS = $CARRIER_OPTIONS

# cat  /etc/rc.comtel
#!/bin/sh
CARRIER="COMTEL"
CARRIER_OPTIONS=""
#CARRIER_OPTIONS="USE_DEFAULT_COOLING=TRUE"  #  enables  default  cooling
strategy (non-zoned)
SHELFMAN_COMMAND_LINE=""  # Add shelfman options, see /etc/rc.common
export CARRIER CARRIER_OPTIONS
/etc/netconfig 1
. /etc/rc.common
```

Appendix C - Part Numbers

Part Number	Item	Description	Comments
041 05403-1	Enclosure ATCA 14S 13U RT BLACK Rev.A0	RT#=9914359, powder painted BLACK	Rittal chassis black painted with 4 blowers
307 03938	ATCA 14Slot FM 13U Upper BP	d=2,73mm	Full Mesh backplane, 40Gbps Ready
041 05401	ATCA 14Slot RT-Blower Unit	RiCool-3 Blower	FRU: Service handle is reusable
471 05561	ATCA 14-slot PPS-ShMC-Unit Rev. A0	including PPS Module, for ATCA 14R systems	FRU: ShMC cassette including front panel, carrier board & shelf manager
471 05577	ATCA 14-slot PEM Unit Rev.A0	For ATCA 14R systems	FRU: Economic PEM
471 05576	ATCA 14-slot FRU & TELCO Unit Rev. A0	For ATCA 14R systems	FRU: FRU data board including the Telco relays and contacts
038 05625	ATCA 14-Slot Air Filter (frameless)	Reuse existing metal frame	FRU: Air Filter 3M High Air Flow size: 441 x 288 x 10 [mm]
Accessories			
471 05577-1	ATCA 14-slot PEM Unit 2Ch Rev.B0	For ATCA 14R systems	FRU: future PEM (two power channels with filter, no fuses, no CB)
471 05576-1	ATCA 14-slot FRU Unit Rev. A0	w/o TELCO Option, for ATCA 14R systems	FRU: FRU data board excluding Telco relays and contacts
022 05524	ATCA 14-slot PEM, Fuse, 20A	Yellow, replace in pairs	To replace, power must be disconnected and PEM must be removed.
022 05525	ATCA 14-slot PEM, Fuse, 30A	Green, replace in pairs	To replace, power must be disconnected and PEM must be removed.
044 05711	ATCA 14-Slot Wire Harness Boots (set of 4)	Safety covers for input terminals	2 black, 2 red
042 05655	ATCA 14-Slot Wire Lugs (set of 4)	Double Lug, ¼" bolt, ¾" pitch, blue	T&B#: 256-30695-1225
041 05696	ATCA 14-Slot Cable Mgmt Tray – Front	Cable duct for 13U shelf – front	
041 05697	ATCA 14Slot Cable Mgmt Tray – Rear	Cable duct for 13U shelf – rear	
041 03894	ATCA Filler Panel, Front, Air Blocker, CRS	Pearl White painted finish	Provides airflow impedance
041 03895	ATCA Filler Panel, RTM, Air Blocker, CRS	Pearl White painted finish	Provides airflow impedance
041 03894-1	ATCA Filler Panel, Front, Air Blocker, CRS	Black painted finish	Provides airflow impedance
041 03895-1	ATCA Filler Panel, RTM, Air Blocker, CRS	Black painted finish	Provides airflow impedance
041 03894-2	ATCA Filler Panel, Front, Air Blocker, AL	Brushed silver finish, accepts FP overlay	Provides airflow impedance, light weight
041 03895-2	ATCA Filler Panel, RTM, Air Blocker, AL	Brushed silver finish, accepts FP overlay	Provides airflow impedance, light weight
041 03894-3	ATCA Filler Panel, Front, Air Blocker, SS	Brushed stainless finish, accepts FP overlay	Provides airflow impedance, light weight
041 03895-3	ATCA Filler Panel, RTM, Air Blocker, SS	Brushed stainless finish, accepts FP overlay	Provides airflow impedance, light weight
041 03894-4	ATCA Filler Panel, Front, Air Blocker, Plastic	Black plastic finish, accepts FP overlay	Provides airflow impedance, light weight
041 03895-4	ATCA Filler Panel, RTM, Air Blocker, Plastic	Black plastic finish, accepts FP overlay	Provides airflow impedance, light weight
041 05709-1	ATCA Filler Panel, Zone-3, Air Blocker, FR4	PCB finish, w/2 screws	Panel 041-05703, screws 041-05704

Appendix D - Shelf FRU Data Information

```
14: FRU # 1, FRU Info
Common Header:    Format Version = 1

Chassis Info Area:
    Version   = 1
    Chassis Type              = (23)
    Chassis Part Number       = 470 05578-3
    Chassis Serial Number     = 3610CR-0006
    Custom Chassis Info       =

Board Info Area:
    Version     = 1
    Language Code             = 25
    Mfg Date/Time             = Jan 29 17:40:00 2006 (5301700 minutes since 1996)
    Board Manufacturer        = Comtel Electronics GmbH
    Board Product Name        = CO14N Dual Star
    Board Serial Number       = 0709624194500069
    Board Part Number         = 307-03533
    FRU Programmer File ID    =
    Custom Board Info         = ECN0001


Product Info Area:
    Version     = 1
    Language Code             = 25
    Manufacturer Name         = Comtel Electronics GmbH
    Product Name              = ATCA 13U 14 slot CO14N shelf
    Product Part / Model#     = 370-05407
    Product Version           = 0001
    Product Serial Number     = 1002624398500031
    Asset Tag                 =
    FRU Programmer File ID    =
    Custom Product Info       =

Multi Record Area:
    PICMG Address Table Record (ID=0x10)
        Version = 0
    Shelf Address             =
    Address Table Entries#    = 28
        Hw Addr: 08 (10), Site # 1, Type: "Dedicated ShMC" 03
        Hw Addr: 09 (12), Site # 2, Type: "Dedicated ShMC" 03
        Hw Addr: 0a (14), Site # 1, Type: "Fan Filter Tray" 05
        Hw Addr: 0a (14), Site # 1, Type: "Shelf FRU Information" 02
        Hw Addr: 0a (14), Site # 1, Type: "Alarm" 06
        Hw Addr: 0c (18), Site # 2, Type: "Fan Filter Tray" 05
        Hw Addr: 0c (18), Site # 2, Type: "Shelf FRU Information" 02
        Hw Addr: 0c (18), Site # 2, Type: "Alarm" 06
        Hw Addr: 41 (82), Site # 7, Type: "AdvancedTCA Board" 00
        Hw Addr: 42 (84), Site # 8, Type: "AdvancedTCA Board" 00
        Hw Addr: 43 (86), Site # 6, Type: "AdvancedTCA Board" 00
        Hw Addr: 44 (88), Site # 9, Type: "AdvancedTCA Board" 00
        Hw Addr: 45 (8a), Site # 5, Type: "AdvancedTCA Board" 00
        Hw Addr: 46 (8c), Site # 10, Type: "AdvancedTCA Board" 00
        Hw Addr: 47 (8e), Site # 4, Type: "AdvancedTCA Board" 00
        Hw Addr: 48 (90), Site # 11, Type: "AdvancedTCA Board" 00
        Hw Addr: 49 (92), Site # 3, Type: "AdvancedTCA Board" 00
        Hw Addr: 4a (94), Site # 12, Type: "AdvancedTCA Board" 00
        Hw Addr: 4b (96), Site # 2, Type: "AdvancedTCA Board" 00
        Hw Addr: 4c (98), Site # 13, Type: "AdvancedTCA Board" 00
        Hw Addr: 4d (9a), Site # 1, Type: "AdvancedTCA Board" 00
        Hw Addr: 4e (9c), Site # 14, Type: "AdvancedTCA Board" 00
        Hw Addr: 60 (c0), Site # 1, Type: "Power Entry" 01
        Hw Addr: 61 (c2), Site # 2, Type: "Power Entry" 01
        Hw Addr: 64 (c8), Site # 1, Type: "Fan Tray" 04
```

```
    Hw Addr: 65 (ca), Site # 2, Type: "Fan Tray" 04
    Hw Addr: 66 (cc), Site # 3, Type: "Fan Tray" 04
    Hw Addr: 67 (ce), Site # 4, Type: "Fan Tray" 04

PICMG Shelf Power Distribution Record (ID=0x11)
    Version = 0
Feed count: 1
Feed:
    Maximum External Available Current: 140.0 Amps
    Maximum Internal Current: 40.0 Amps
    Minimum Expected Operating Voltage: -40.5 Volts
    Feed-to-FRU Mapping entries count: 4
       FRU Addr: 42 (84), FRU ID: 0xfe
       FRU Addr: 46 (8c), FRU ID: 0xfe
       FRU Addr: 4a (94), FRU ID: 0xfe
       FRU Addr: 4e (9c), FRU ID: 0xfe

PICMG Shelf Power Distribution Record (ID=0x11)
    Version = 0
Feed count: 1
Feed:
    Maximum External Available Current: 140.0 Amps
    Maximum Internal Current: 40.0 Amps
    Minimum Expected Operating Voltage: -40.5 Volts
    Feed-to-FRU Mapping entries count: 4
       FRU Addr: 41 (82), FRU ID: 0xfe
       FRU Addr: 44 (88), FRU ID: 0xfe
       FRU Addr: 48 (90), FRU ID: 0xfe
       FRU Addr: 4c (98), FRU ID: 0xfe

PICMG Shelf Power Distribution Record (ID=0x11)
    Version = 0
Feed count: 1
Feed:
    Maximum External Available Current: 140.0 Amps
    Maximum Internal Current: 40.0 Amps
    Minimum Expected Operating Voltage: -40.5 Volts
    Feed-to-FRU Mapping entries count: 3
       FRU Addr: 43 (86), FRU ID: 0xfe
       FRU Addr: 47 (8e), FRU ID: 0xfe
       FRU Addr: 4b (96), FRU ID: 0xfe

PICMG Shelf Power Distribution Record (ID=0x11)
    Version = 0
Feed count: 1
Feed:
    Maximum External Available Current: 140.0 Amps
    Maximum Internal Current: 40.0 Amps
    Minimum Expected Operating Voltage: -40.5 Volts
    Feed-to-FRU Mapping entries count: 3
       FRU Addr: 45 (8a), FRU ID: 0xfe
       FRU Addr: 49 (92), FRU ID: 0xfe
       FRU Addr: 4d (9a), FRU ID: 0xfe

PICMG Shelf Power Distribution Record (ID=0x11)
    Version = 0
Feed count: 1
Feed:
    Maximum External Available Current: 140.0 Amps
    Maximum Internal Current: 40.0 Amps
    Minimum Expected Operating Voltage: -40.5 Volts
    Feed-to-FRU Mapping entries count: 10
       FRU Addr: 08 (10), FRU ID: 0xfe
       FRU Addr: 09 (12), FRU ID: 0xfe
       FRU Addr: 0a (14), FRU ID: 0xfe
       FRU Addr: 0c (18), FRU ID: 0xfe
       FRU Addr: 60 (c0), FRU ID: 0xfe
```

```
       FRU Addr: 61 (c2), FRU ID: 0xfe
       FRU Addr: 64 (c8), FRU ID: 0xfe
       FRU Addr: 65 (ca), FRU ID: 0xfe
       FRU Addr: 66 (cc), FRU ID: 0xfe
       FRU Addr: 67 (ce), FRU ID: 0xfe

PICMG Shelf Power Distribution Record (ID=0x11)
    Version = 0
Feed count: 1
Feed:
    Maximum External Available Current: 140.0 Amps
    Maximum Internal Current: 40.0 Amps
    Minimum Expected Operating Voltage: -40.5 Volts
    Feed-to-FRU Mapping entries count: 4
       FRU Addr: 42 (84), FRU ID: 0xfe
       FRU Addr: 46 (8c), FRU ID: 0xfe
       FRU Addr: 4a (94), FRU ID: 0xfe
       FRU Addr: 4e (9c), FRU ID: 0xfe

PICMG Shelf Power Distribution Record (ID=0x11)
    Version = 0
Feed count: 1
Feed:
    Maximum External Available Current: 140.0 Amps
    Maximum Internal Current: 40.0 Amps
    Minimum Expected Operating Voltage: -40.5 Volts
    Feed-to-FRU Mapping entries count: 4
       FRU Addr: 41 (82), FRU ID: 0xfe
       FRU Addr: 44 (88), FRU ID: 0xfe
       FRU Addr: 48 (90), FRU ID: 0xfe
       FRU Addr: 4c (98), FRU ID: 0xfe

PICMG Shelf Power Distribution Record (ID=0x11)
    Version = 0
Feed count: 1
Feed:
    Maximum External Available Current: 140.0 Amps
    Maximum Internal Current: 40.0 Amps
    Minimum Expected Operating Voltage: -40.5 Volts
    Feed-to-FRU Mapping entries count: 3
       FRU Addr: 43 (86), FRU ID: 0xfe
       FRU Addr: 47 (8e), FRU ID: 0xfe
       FRU Addr: 4b (96), FRU ID: 0xfe

PICMG Shelf Power Distribution Record (ID=0x11)
    Version = 0
Feed count: 1
Feed:
    Maximum External Available Current: 140.0 Amps
    Maximum Internal Current: 40.0 Amps
    Minimum Expected Operating Voltage: -40.5 Volts
    Feed-to-FRU Mapping entries count: 3
       FRU Addr: 45 (8a), FRU ID: 0xfe
       FRU Addr: 49 (92), FRU ID: 0xfe
       FRU Addr: 4d (9a), FRU ID: 0xfe

PICMG Shelf Power Distribution Record (ID=0x11)
    Version = 0
Feed count: 1
Feed:
    Maximum External Available Current: 140.0 Amps
    Maximum Internal Current: 40.0 Amps
    Minimum Expected Operating Voltage: -40.5 Volts
    Feed-to-FRU Mapping entries count: 10
       FRU Addr: 08 (10), FRU ID: 0xfe
       FRU Addr: 09 (12), FRU ID: 0xfe
       FRU Addr: 0a (14), FRU ID: 0xfe
       FRU Addr: 0c (18), FRU ID: 0xfe
```

```
        FRU Addr: 60 (c0), FRU ID: 0xfe
        FRU Addr: 61 (c2), FRU ID: 0xfe
        FRU Addr: 64 (c8), FRU ID: 0xfe
        FRU Addr: 65 (ca), FRU ID: 0xfe
        FRU Addr: 66 (cc), FRU ID: 0xfe
        FRU Addr: 67 (ce), FRU ID: 0xfe

PICMG Shelf Activation And Power Management Record (ID=0x12)
    Version = 0
Allowance for FRU Activation Readiness: 10 seconds
FRU Activation and Power Description Count: 24
Hw Address: 08 (10), FRU ID: 0xfe, Maximum FRU Power Capabilities: 20 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 09 (12), FRU ID: 0xfe, Maximum FRU Power Capabilities: 20 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 0a (14), FRU ID: 0xfe, Maximum FRU Power Capabilities: 20 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 0c (18), FRU ID: 0xfe, Maximum FRU Power Capabilities: 20 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 41 (82), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 42 (84), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 43 (86), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 44 (88), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 45 (8a), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 46 (8c), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 47 (8e), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 48 (90), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 49 (92), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 4a (94), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds
```

```
Hw Address: 4b (96), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 4c (98), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 4d (9a), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 4e (9c), FRU ID: 0xfe, Maximum FRU Power Capabilities: 400 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 60 (c0), FRU ID: 0xfe, Maximum FRU Power Capabilities: 20 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 61 (c2), FRU ID: 0xfe, Maximum FRU Power Capabilities: 20 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 64 (c8), FRU ID: 0xfe, Maximum FRU Power Capabilities: 200 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 65 (ca), FRU ID: 0xfe, Maximum FRU Power Capabilities: 200 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 66 (cc), FRU ID: 0xfe, Maximum FRU Power Capabilities: 200 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds

Hw Address: 67 (ce), FRU ID: 0xfe, Maximum FRU Power Capabilities: 200 Watts
    Shelf Manager Controlled Activation: Enabled
    Delay Before Next Power On: 0.0 seconds


PICMG Backplane Point-to-Point Connectivity Record (ID=0x04)
    Version = 0
P2P Slot Descriptor:
    Channel Type         = 0x0D PICMG 3.0 ShMC Cross-Connect
    LocalSlot/HW Address = 0x41 (0x82)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x08 (0x10)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 2, RemoteSlot 0x09 (0x12)
P2P Slot Descriptor:
    Channel Type         = 0x0D PICMG 3.0 ShMC Cross-Connect
    LocalSlot/HW Address = 0x42 (0x84)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x09 (0x12)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 2, RemoteSlot 0x08 (0x10)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x41 (0x82)
    Channel Count        = 0x0E
    Channel Descriptor   = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x08 (0x10)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 2, RemoteSlot 0x42 (0x84)
    Channel Descriptor   = LocalChannel 3, RemoteChannel 1, RemoteSlot 0x43 (0x86)
    Channel Descriptor   = LocalChannel 4, RemoteChannel 1, RemoteSlot 0x44 (0x88)
    Channel Descriptor   = LocalChannel 5, RemoteChannel 1, RemoteSlot 0x45 (0x8A)
    Channel Descriptor   = LocalChannel 6, RemoteChannel 1, RemoteSlot 0x46 (0x8C)
    Channel Descriptor   = LocalChannel 7, RemoteChannel 1, RemoteSlot 0x47 (0x8E)
    Channel Descriptor   = LocalChannel 8, RemoteChannel 1, RemoteSlot 0x48 (0x90)
    Channel Descriptor   = LocalChannel 9, RemoteChannel 1, RemoteSlot 0x49 (0x92)
```

```
    Channel Descriptor   = LocalChannel 10, RemoteChannel 1, RemoteSlot 0x4A (0x94)
    Channel Descriptor   = LocalChannel 11, RemoteChannel 1, RemoteSlot 0x4B (0x96)
    Channel Descriptor   = LocalChannel 12, RemoteChannel 1, RemoteSlot 0x4C (0x98)
    Channel Descriptor   = LocalChannel 13, RemoteChannel 1, RemoteSlot 0x4D (0x9A)
    Channel Descriptor   = LocalChannel 14, RemoteChannel 1, RemoteSlot 0x4E (0x9C)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x42 (0x84)
    Channel Count        = 0x0E
    Channel Descriptor   = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x09 (0x12)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 2, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 3, RemoteChannel 2, RemoteSlot 0x43 (0x86)
    Channel Descriptor   = LocalChannel 4, RemoteChannel 2, RemoteSlot 0x44 (0x88)
    Channel Descriptor   = LocalChannel 5, RemoteChannel 2, RemoteSlot 0x45 (0x8A)
    Channel Descriptor   = LocalChannel 6, RemoteChannel 2, RemoteSlot 0x46 (0x8C)
    Channel Descriptor   = LocalChannel 7, RemoteChannel 2, RemoteSlot 0x47 (0x8E)
    Channel Descriptor   = LocalChannel 8, RemoteChannel 2, RemoteSlot 0x48 (0x90)
    Channel Descriptor   = LocalChannel 9, RemoteChannel 2, RemoteSlot 0x49 (0x92)
    Channel Descriptor   = LocalChannel 10, RemoteChannel 2, RemoteSlot 0x4A (0x94)
    Channel Descriptor   = LocalChannel 11, RemoteChannel 2, RemoteSlot 0x4B (0x96)
    Channel Descriptor   = LocalChannel 12, RemoteChannel 2, RemoteSlot 0x4C (0x98)
    Channel Descriptor   = LocalChannel 13, RemoteChannel 2, RemoteSlot 0x4D (0x9A)
    Channel Descriptor   = LocalChannel 14, RemoteChannel 2, RemoteSlot 0x4E (0x9C)

PICMG Backplane Point-to-Point Connectivity Record (ID=0x04)
    Version = 0
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x43 (0x86)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 3, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 3, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x44 (0x88)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 4, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 4, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x45 (0x8A)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 5, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 5, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x46 (0x8C)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 6, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 6, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x47 (0x8E)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 7, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 7, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x48 (0x90)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 8, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 8, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x49 (0x92)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 9, RemoteSlot 0x41 (0x82)
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    Channel Descriptor   = LocalChannel 2, RemoteChannel 9, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x4A (0x94)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 10, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 10, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x4B (0x96)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 11, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 11, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x4C (0x98)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 12, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 12, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x4D (0x9A)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 13, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 13, RemoteSlot 0x42 (0x84)

PICMG Backplane Point-to-Point Connectivity Record (ID=0x04)
    Version = 0
P2P Slot Descriptor:
    Channel Type         = 0x0B PICMG 3.0 Base Interface
    LocalSlot/HW Address = 0x4E (0x9C)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 14, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 14, RemoteSlot 0x42 (0x84)

PICMG Backplane Point-to-Point Connectivity Record (ID=0x04)
    Version = 0
P2P Slot Descriptor:
    Channel Type         = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x41 (0x82)
    Channel Count        = 0x01
    Channel Descriptor   = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x42 (0x84)
    Channel Count        = 0x01
    Channel Descriptor   = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x41 (0x82)
P2P Slot Descriptor:
    Channel Type         = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x43 (0x86)
    Channel Count        = 0x01
    Channel Descriptor   = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x44 (0x88)
P2P Slot Descriptor:
    Channel Type         = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x44 (0x88)
    Channel Count        = 0x01
    Channel Descriptor   = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x43 (0x86)
P2P Slot Descriptor:
    Channel Type         = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x45 (0x8A)
    Channel Count        = 0x01
    Channel Descriptor   = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x46 (0x8C)
P2P Slot Descriptor:
    Channel Type         = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x46 (0x8C)
    Channel Count        = 0x01
    Channel Descriptor   = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x45 (0x8A)
P2P Slot Descriptor:
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    Channel Type          = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x47 (0x8E)
    Channel Count         = 0x01
    Channel Descriptor    = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x48 (0x90)
P2P Slot Descriptor:
    Channel Type          = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x48 (0x90)
    Channel Count         = 0x01
    Channel Descriptor    = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x47 (0x8E)
P2P Slot Descriptor:
    Channel Type          = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x49 (0x92)
    Channel Count         = 0x01
    Channel Descriptor    = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x4A (0x94)
P2P Slot Descriptor:
    Channel Type          = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x4A (0x94)
    Channel Count         = 0x01
    Channel Descriptor    = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x49 (0x92)
P2P Slot Descriptor:
    Channel Type          = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x4B (0x96)
    Channel Count         = 0x01
    Channel Descriptor    = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x4C (0x98)
P2P Slot Descriptor:
    Channel Type          = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x4C (0x98)
    Channel Count         = 0x01
    Channel Descriptor    = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x4B (0x96)
P2P Slot Descriptor:
    Channel Type          = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x4D (0x9A)
    Channel Count         = 0x01
    Channel Descriptor    = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x4E (0x9C)
P2P Slot Descriptor:
    Channel Type          = 0x0C PICMG 3.0 Update Channel Interface
    LocalSlot/HW Address = 0x4E (0x9C)
    Channel Count         = 0x01
    Channel Descriptor    = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x4D (0x9A)

PICMG Backplane Point-to-Point Connectivity Record (ID=0x04)
    Version = 0
P2P Slot Descriptor:
    Channel Type          = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x41 (0x82)
    Channel Count         = 0x0D
    Channel Descriptor    = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x42 (0x84)
    Channel Descriptor    = LocalChannel 2, RemoteChannel 1, RemoteSlot 0x43 (0x86)
    Channel Descriptor    = LocalChannel 3, RemoteChannel 1, RemoteSlot 0x44 (0x88)
    Channel Descriptor    = LocalChannel 4, RemoteChannel 1, RemoteSlot 0x45 (0x8A)
    Channel Descriptor    = LocalChannel 5, RemoteChannel 1, RemoteSlot 0x46 (0x8C)
    Channel Descriptor    = LocalChannel 6, RemoteChannel 1, RemoteSlot 0x47 (0x8E)
    Channel Descriptor    = LocalChannel 7, RemoteChannel 1, RemoteSlot 0x48 (0x90)
    Channel Descriptor    = LocalChannel 8, RemoteChannel 1, RemoteSlot 0x49 (0x92)
    Channel Descriptor    = LocalChannel 9, RemoteChannel 1, RemoteSlot 0x4A (0x94)
    Channel Descriptor    = LocalChannel 10, RemoteChannel 1, RemoteSlot 0x4B (0x96)
    Channel Descriptor    = LocalChannel 11, RemoteChannel 1, RemoteSlot 0x4C (0x98)
    Channel Descriptor    = LocalChannel 12, RemoteChannel 1, RemoteSlot 0x4D (0x9A)
    Channel Descriptor    = LocalChannel 13, RemoteChannel 1, RemoteSlot 0x4E (0x9C)
P2P Slot Descriptor:
    Channel Type          = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x42 (0x84)
    Channel Count         = 0x0D
    Channel Descriptor    = LocalChannel 1, RemoteChannel 1, RemoteSlot 0x41 (0x82)
    Channel Descriptor    = LocalChannel 2, RemoteChannel 2, RemoteSlot 0x43 (0x86)
    Channel Descriptor    = LocalChannel 3, RemoteChannel 2, RemoteSlot 0x44 (0x88)
    Channel Descriptor    = LocalChannel 4, RemoteChannel 2, RemoteSlot 0x45 (0x8A)
```

```
    Channel Descriptor   = LocalChannel 5, RemoteChannel 2, RemoteSlot 0x46 (0x8C)
    Channel Descriptor   = LocalChannel 6, RemoteChannel 2, RemoteSlot 0x47 (0x8E)
    Channel Descriptor   = LocalChannel 7, RemoteChannel 2, RemoteSlot 0x48 (0x90)
    Channel Descriptor   = LocalChannel 8, RemoteChannel 2, RemoteSlot 0x49 (0x92)
    Channel Descriptor   = LocalChannel 9, RemoteChannel 2, RemoteSlot 0x4A (0x94)
    Channel Descriptor   = LocalChannel 10, RemoteChannel 2, RemoteSlot 0x4B (0x96)
    Channel Descriptor   = LocalChannel 11, RemoteChannel 2, RemoteSlot 0x4C (0x98)
    Channel Descriptor   = LocalChannel 12, RemoteChannel 2, RemoteSlot 0x4D (0x9A)
    Channel Descriptor   = LocalChannel 13, RemoteChannel 2, RemoteSlot 0x4E (0x9C)
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x43 (0x86)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 2, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 2, RemoteSlot 0x42 (0x84)

PICMG Backplane Point-to-Point Connectivity Record (ID=0x04)
    Version = 0
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x44 (0x88)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 3, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 3, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x45 (0x8A)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 4, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 4, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x46 (0x8C)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 5, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 5, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x47 (0x8E)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 6, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 6, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x48 (0x90)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 7, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 7, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x49 (0x92)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 8, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 8, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x4A (0x94)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 9, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 9, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x4B (0x96)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 10, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 10, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
```

```
    LocalSlot/HW Address = 0x4C (0x98)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 11, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 11, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x4D (0x9A)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 12, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 12, RemoteSlot 0x42 (0x84)
P2P Slot Descriptor:
    Channel Type         = 0x0A PICMG 3.0 Full Channel Fabric Interface
    LocalSlot/HW Address = 0x4E (0x9C)
    Channel Count        = 0x02
    Channel Descriptor   = LocalChannel 1, RemoteChannel 13, RemoteSlot 0x41 (0x82)
    Channel Descriptor   = LocalChannel 2, RemoteChannel 13, RemoteSlot 0x42 (0x84)

PICMG Shelf Manager IP Connection Record (ID=0x13)
    Version = 1
Shelf Manager IP Address = 192.168.0.171
Default Gateway Address = 0.0.0.0 (Not Specified)
Subnet Mask = 255.255.255.0

PICMG Shelf Manager IP Connection Record (ID=0x13)
    Version = 1
Shelf Manager IP Address = 172.16.0.171
Default Gateway Address = 172.16.0.170
Subnet Mask = 255.255.0.0
```